



# MILATARI NEWSLETTER

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## October MILATARI activities

- 14th - 7:00AM to 6:00PM HAM FEST at Waukesha EXPO Center  
MILATARI will rent a table at the largest ham radio and hobby computer swap fest in the area. Members may bring items they wish to sell or trade. You must pay \$3 to enter - table space at the MILATARI table will be provide to our membership for \$1.00.
- 17th - 7:30PM MILATARI board meeting - Chris Steiber's home
- 20th - 2:00PM MILATARI MEETING - Armbruster School - Greendale  
2:00PM WORKSHOP - Review of data base software on the market for ATARI computers.  
3:30PM TECHNICAL SESSION - An opportunity to discuss your technical questions and share your ATARI computer experiences with other MILATARI members.
- 4:30PM BUSINESS MEETING
- 5:00PM VIDEO PRESENTATION - Two films from DELCO  
"SILICON SAND TO SOLID STATE"  
How IC's are built  
"DELCO ELECTRONICS - HIGH TECHNOLOGY"  
Our technology and the car of the future
- 25th - 7:30PM MILATARI MEETING - Waukesha State Bank Community Room  
ATARI 810 and 1050 disk drive tune-up clinic  
Bring in your ATARI disk drives and have them cleaned, lubricated and timed.
- 30th - 8:00PM ATR8000:CP/M SIG meeting - Don Wilcox's home  
Work shop on how to install CP/M programs
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**PRESIDENT'S RAM**  
by Gary Nolan

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**TRICK OR TREAT.....**

When you think about it there's a lot happening in October besides Halloween. This is the month for the Hamfest at the Waukesha Expo Center. Milatari will have a table this year to sell shirts and public domain software. And if you have anything you'd like to sell in the way of excess equipment or software, come on out and put it on the table. As long as you're a member you can use our space and it will only cost you a buck plus the price of admission. The Hamfest will be held Sun, Oct. 14th and starts at 7am for sellers and opens to the public at eight. If this newsletter gets to you before the 14th we will have some advance tickets for \$2.50. Cost at the door is \$3, for more details call me.

A lot of people are upgrading their drives, either to double density or to double sided. A special purchase of the Panasonic DSDD half high drives is being put together and a few have not been spoken for. If you're interested give me a call and I'll let you know the details. These drives DO NOT have either a case or power supply but can be used to replace that old single sided drive you've got hooked up to your ATR or with a Percom or Trak drive.

**HELP WANTED**

Member Bruce Schute is looking for some programming help. He was having someone write a work scheduling program written for him and for reasons I don't remember it wasn't finished. But it's in basic and since Bruce is somewhat of a beginner with computers he needs help in putting the finishing touches on it. If you'd like to help (for free or for pay) give Bruce a call at 762-1531, in the evening.

Mark Wentley wants to buy any kind of Atari computers. If you've got one to sell see Mark at the meeting. I don't have Marks number, sorry.

And the last call for help comes from a person who needs help and would like to talk to people who are interfacing external devices to the computer. Again I have no phone number but if you'd like to exchange ideas call me and I'll relay your name and number to him.

**TODAY PLASTER CHIPS, TOMORROW THE ROOF!**

Nibble, an Apple type magazine has been awarded a permanent injunction against Amtype to prevent them from copying programs out of their mag and making copies of those programs for others. If you're not familiar with Amtype here's how they work. You pay them a yearly fee and every month they type in programs from one of several magazines and send you a disk or cassette with the programs on it. Well Nibble claims and ONE judge agreed that Amtype violated Nibbles copyright license by typing in the program once then making copies of that program. But judges decisions like armchair quarterbacks opinions vary, ask ten and you'll get seven different answers. But in this case if you get the same answer three times in a row, YER OUT. Needless to say, Amtype will appeal. This could have far reaching consequences for a lot of user groups. Stay tuned!!!

**THE LONGER YOU WAIT, THE MORE IT'LL COST YOU**

In the computer market the longer something is on the market, the lower the price becomes. Everything has dropped in price from its introduction. Until now that is. Noumenon Corp of Calif. has adopted a new pricing policy and here's how it works. It releases a product for sale and then RAISES the price \$20 each week until demand levels off and then freezes the price. For example their first offering a program called Intuit for the IBM-PC was released in mid-August for \$50, five weeks later it was \$150. They sell only by mail and have limited advertising. The louder they talk the less they make.

**IT'S TOO BIG TO HIDE**

Seems that Atari's no-show at Taricon '84 was noticed by more people than just those who DID show up. InfoWorld even noted their absence in a recent issue. They also printed what we'll use for:

**RUMORS OF THE MONTH**

Supposedly Fast Jack has 200,000 computers and 5 million game machines in some warehouse. With these he hopes to make this a painful Christmas season for Commodore. How does a \$99, 800XL sound, and I've heard prices as low as \$59 thrown around.

# COLORS OF FALL SALE

**Save another 10-20-30%  
off our already discounted prices.**

Fall is bustin' out all over at Computer Software Center. During October, the Colors of Fall will save you another 10-20-30% off our already discounted prices. These sale discounts have been applied to selected items of software, accessories and books.

Come in and look for the colored leaves indicating the amount of added discount. Yellow leaves get 30% discount, brown leaves 20% and red leaves 10%.

Remember, these Colors of Fall discounts are IN ADDITION to our already discounted prices. The resulting prices may be only a fraction of their suggested retails. Drop by soon. The sale lasts until October 31st, BUT the earlier you get in, the better your selection will be.



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## EXTENDED HOURS ON MILATARI SATURDAY

Effective this month, we will begin extended hours on the Saturday of the MILATARI meeting. On these Saturdays, our hours will be 11AM to 6PM.

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## PRESIDENT'S RAM (Continued)

My next guest rumor monger claims that Atari WILL introduce a Apple compatible operating system at the winter CES. And this one will not violate any patents.

Nothing new concerning the expansion module or any new computers, but if I hear anything you'll hear about it.

## SO THAT'S HOW THEY DO IT!!!

At this months meeting we will have two taped programs showing how the chips inside your computer are made and one on how the computerized control modules that are being put in the new cars are made.

## HEY, LOOK AT THAT

DataArts Software has a program called TYPE-SETTER that gives some printers the ability to print in many different typefaces. The program requires 48K RAM, disk drive and printer interface and comes with four fonts Roman, DAS Data, Helios Light and Old English. It can be expanded to over 100 fonts (at extra cost) and works with Centronics 739/Atari 825, Epson MX-FX-RX, Gemini 10X, NEC 8023, Prowriter 8510 and Gorilla Banana printers. Cost is \$29.95 + \$2 S/H, order from:

DataArts Software  
P.O. Box 1613  
Troy, NY 12181  
(518) 785-0450

## DATA IN -- DATA OUT

This months workshop will be an overview of databases. If you are interested in them but don't know what's available for the Atari, drop by the workshop and maybe we can help you get a handle on them. And if you have any suggestions on future workshops let Tom Jacobs or Ben Wong know. And if you'd like to help at this or other sessions you can call Tom at 444-5390 or Ben at 784-5879.

## ONE MORE - TIME?

Those of you who were interested in the Seiko computer watch listen up. The watch that I mentioned at the last meeting is slightly different than the one I reported about at the June meeting. The watch that's available now comes with the smaller keyboard and cannot be programmed

in basic and is a data in only unit. It still has 2K of memory though and has the same size display area, four lines of ten characters. No word on when the bigger keyboard or RS232 adaptor will be available. Sorry techies, keep faith it'll get here. If you're still interested let me know.

## SO THAT'S HOW YOU DO IT

This months CP/M SIG meeting will be delayed one week until Oct. 30th as Don Wilcox will be out of town. At the meeting we will go over installing some of the programs on the ATR8000. If you've been having troubles getting some of your programs to run we may be able to help. If we have time we'll go over upgrading your single sided drives to double sided.

## LET ME MAKE THIS PERFECTLY CLEAR

The Hamfest is on the Oct. 14th at the Waukesha Expo Center, 7am - 5pm. The Board of Directors meeting at Chris Steibers house on WED., Oct. 17th at 7pm. If you'd like to attend as a member at large give Chris a call. This is your club and we'd like your input. The Saturday meeting on the 20th at Armbruster School, 2pm. MilAtari-West on Thur. the 25th at Waukesha State Bank, 7:30pm. The CP/M SIG meeting on Tue. the 30th, 7:30pm

Due to family commitments I will miss my first meeting in 2 1/2 years, but I'm sure that Chris and the rest of you can handle it. So until next months N/L I'll say BYE.....

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# ATARI INTERRUPT STRUCTURE and THE SERIAL PORT

by Donald B. Wilcox

Interrupts permit events to gain immediate access to the computer without the necessity of your software constantly checking (polling) to determine whether or not a device needs to communicate with the computer. When an interrupt is enabled (able to respond), it will automatically gain access to the computer when necessary, perform its task, then return control to the normal program that was running before the interrupt. As an example, if someone calls you (interrupts you) on the telephone, the bell rings for your attention to let you know that an interrupt has occurred. You are not required to constantly pick up the phone to see if someone wants to talk to you. Each type of interrupt has its own location in memory where its program is stored. A pointer (vector) is a special memory location that contains the address of the program to run. When the interrupt occurs, the computer checks the address (vector) associated with that particular interrupt, then transfers control to the location indicated by the vector pointer. After the interrupt program is finished with its task, it returns control to the program that was running before the interrupt, much the same as you would return to your prior activity after answering a telephone call.

This article is oriented primarily to the Atari serial port which is a thirteen pin connector for communicating with peripheral devices. This is the port to which you normally connect your disk drive, cassette recorder or any other serial transmission device. Figure 1. depicts the pin configuration of the serial port.

2 4 6 8 10 12

1 3 5 7 9 11 13

Figure 1: Serial Port

This article discusses the use of pins 9 and 13 which are currently unused by any standard devices and which are essentially ignored by the operating system. Both of these pins are part of the interrupt processing structure. We will digress temporarily to provide a cursory overview of the Atari interrupt process to enhance our

understanding before discussing the Serial Input, Output (SIO) port. There are two types of interrupts available at the processor level. The first is a nonmaskable interrupt (NMI), the second is a maskable (IRQ) interrupt.

The Nonmaskable interrupts are handled by the operating system. These include the SYSTEM RESET, DISPLAY LIST, and VERTICAL BLANK interrupts. Although there are no vectors available for the SYSTEM RESET, it can be trapped by using the DOSINI at locations 12, 13. In a disk drive environment, DOS is initialized whenever SYSTEM RESET is activated, thus the DOS initialization vector can be used to trap SYSTEM RESET. (See De Re Atari, Chapter 8, Memory Management subsection for additional information.) The DISPLAY LIST is not used by the operating system, but it is vectored for control through the ANTIC chip. If the Display List Interrupt (DLI) is enabled by the user, then you can have the vector at locations at 512, 513 point to your DLI routine. The Vertical Blank Interrupt (VBI) is vectored at two locations, one is for the immediate mode interrupt and the second is for the deferred mode interrupt. Each of these can be intercepted by the user to activate a small user written module. The immediate mode is vectored at locations 546, 547; the deferred mode is vectored at locations 548, 549. Although these NMI's cannot be masked at the 6502 chip level, the Atari ANTIC chip can be used to enable and disable both the DLI and the VBI. (See De Re Atari, Chapter 8, 'The NMI Handler' subsection.)

The maskable interrupts (IRQ) are handled by the Peripheral Interface Adapter (PIA) chip and the Atari POKEY chip. Each of the IRQ interrupts are vectored and are accessible to the user. (The BREAK key was not vectored in the old Operating System, version A, but is vectored in revision B).

A second digression may be in order at this point for those who are unfamiliar with the concepts of vectors and interrupt processing. Each interrupt module is activated either by the operating system (automatically) or by the user. The user can activate an interrupt in their program software or by a manual input

## ATARI INTERRUPT STRUCTURE and THE SERIAL PORT (Continued)

from the keyboard, joystick ports or SIO port. As an example, each time you press a key on the keyboard, you activate the keyboard interrupt which is vectored at locations 520, 521. This means that the computer looks at the memory address stored in locations 520, 521 and then transfers control to that part of the memory. You could write a routine, store it at a specific memory location, put the address of your routine at locations 520, 521; then when a key is pressed on the keyboard, the computer will transfer directly to your program. This technique can be used to disable the break key with operating system version B. The Break key is vectored at 566, 567. Normally, these locations point to (are vectored to) address 59220 which is the beginning of the normal break key routine. If you change the values at locations 566, 567 to point to 59279, the break key will be inoperable. The reason is that location 59279 contains the assembly language mnemonics: PLA, RTI. This causes the computer to do nothing but return to where it was before the interrupt occurred. If desired you could change the break key vector to point to a special software routine to be activated when the break key is pressed. (Note: The console keys; OPTION, SELECT & START are not available though the interrupt process, but the user can write software that monitors their status).

Finally, we come back to pins 9 and 13 of the SIO port. Both of these pins are vectored and are interrupt activated. The activation of the interrupt process is caused by (triggered by) a falling edge (voltage suddenly goes low from 5 volts to 0 volts). This falling edge trigger is normally supplied or caused by an attached peripheral device connected to the SIO port. The attached device would have to be designed to provide this falling edge as well as conform to the other transmission parameters associated with the transfer of serial data between the Atari and attached devices. You can create your own interrupt manually by connecting a wire to either pin 9 or 13 and touching it to another wire connected to a GROUND pin (pins 4 & 6 are GROUND pins). You will have the problem of 'bounce', that is, a manual attempt to touch two wires together creates in reality, dozens or even hundreds of touches, creating an interrupt

each touch. Normally, falling edges are generated electronically to produce the equivalent of just one touch of the wires. You can minimize this problem by including in your interrupt driven software, a long delay before reactivating the interrupt vectors.

To enable or disable (activate or deactivate) interrupt pins 9 and 13 at the SIO port, you must use respectively Port A Control (PACTL at location 54018) for pin 9 and use Port B Control (PBCTL at location 54019). For those of you unfamiliar with bits and bytes, a short explanation may be helpful. A byte is a single character or a number such as a 'Y' or a '3'. Each key on the keyboard can generate a byte of data including all the special characters. Each byte is comprised of 8 bits. A bit can be either a '1' or a '0', only these two values (binary base) are recognized by the computer. All programs and data are represented by a string of '1's and '0's. The computer can correlate different patterns of '1's and '0's with different characters. There are 8 bits in each byte. Since each bit can be either a '1' or a '0', there are  $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$  or 65536 different patterns of 8 bits possible. 1 K (kilobyte) equals  $2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2 \times 2$  (1024) bytes.  $65536/1024 = 64$  K or the maximum number of different 8 bit patterns that can be recognized, therefore the maximum number of memory locations that can be addressed in an 8 bit machine such as the 6502 which is the microprocessor chip found in the Atari, Apple and Commodore. Figure 2 illustrates the naming of the bits in each byte.

7 6 5 4 3 2 1 0

Figure 2. Bit Names

Returning now to our discussion of interrupts, pin 9 is enabled by making bit 0 (lowest order bit) equal to '1'. PACTL normally contains the value 60. You can enable pin 9 by poking a 61 into location 54018. Analogously, you can enable pin 13 by poking a 61 into location 54019. It may seem strange to use the locations that control the joystick parallel ports to also enable the serial port pins 9 & 13, but this is because the PIA chip was engineered by Atari in this

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## THE INTERRUPT STRUCTURE and THE SERIAL PORT (Continued)

manner. (Maybe it is because there were no more bits available at the normal IRQ enable location 53774 which is used to control all the other maskable (IRQ) interrupts).

In reality, there is another mode of operation for pins 9 and 13 that does not require enabling the vectored interrupts and is readily available from software written in BASIC. For those of you who have some competency in ASSEMBLY language, the above should be sufficient to point you in the right direction for utilizing these special interrupt driven pins. (For more details See Mapping The Atari by Ian Chadwick, Atari Hardware Manual, Operating System Manual and Operating System Source Code and De Re Atari). For those of you who have yet to venture into the esoteric world of ASSEMBLY language, I offer the following technique for using pins 9 & 13 from BASIC.

Even when pins 9 & 13 have not been enabled by setting bit 0 to a '1' to respond to vectored interrupts, they do nevertheless take notice that an interrupt occurred. When an interrupt occurs at pin 9, bit 7 (highest order bit) of location 54018 (PACTL) is set to a '1' even though the interrupt vectors are not enabled. Bit 7 is called the STATUS bit. This status bit will remain set to '1' until the PACTL register (memory location) is read. PACTL usually contains the value 60, bits 3,4,5, & 6 are each set to '1'. If the enable bit (bit '0') remains '0' and an interrupt occurs, then bit 7 is set to '1'. This creates a value of 188 (original value of 60 plus 128 from bit 7). Reading (peeking) this register (PACTL) will set bit 7 back to zero. The same process applies to pin 13 using however location 54019 (PBCTL) instead.

The following BASIC program demonstrates this process.

```
100 REM PIN 13 INTERRUPT DEMO FOR MILATARI
    NEWSLETTER
110 REM D.B.WILCOX 9-6-84
120 REM CONNECT ONE WIRE TO PIN 13 OF THE SIO PORT
130 REM (I/O CONNECTORS ON BACK OF DISK DRIVE)
140 REM IF NO DISK DRIVE, THEN CONNECT TO SIO PORT
    ON COMPUTER
150 REM WHERE YOU NORMALLY CONNECT THE DISK DRIVE.
```

```
160 REM CONNECT OTHER WIRE TO PIN 6 (GROUND)
170 REM BASIC INTERRUPT PROGRAM BEGINS AT LINE 200
200 PRINT CHR$(125);"TOUCH WIRES TOGETHER TO
    INTERRUPT"
210 PRINT PEEK(54019):REM PORT B CONTROL REGISTER
220 IF PEEK(54019)<>188 THEN 220:REM WAIT HERE FOR
    INTERRUPT
230 IF PEEK(54019)=188 THEN PRINT
    CHR$(125);CHR$(253);CHR$(253)
240 PRINT "INTERRUPT OCCURRED"
250 PRINT PEEK(54019):GOTO 200
```

=====

LINE VOLTAGE PROTECTORS FOR YOUR COMPUTER  
(continued from page 10)

protect against this? A MOV. This time I DO recommend investing the money. Any home can be hit by lightning, even apartment buildings. But even more important than a surge suppressor in an insurance policy that covers lightning damage. If you think about it, you really don't need a lightning suppressor. Imagine your washer and dryer are damaged, some of the burners on your electric range are out, your TV tube was blown up onto the living room rug, there's a huge hole burnt in your roof - but your computer still works! I had a MOV installed by an electrician onto the MAIN circuit breaker of my house for \$125. It protects all of the circuits, not just the computer. However, surge suppressors are good for perhaps one hit. Contrary to public belief, lightning often strikes twice (or at least with twin surges). The MOV battles the first wave of volts, but then my wall of protection is down. Or perhaps the lightning strike hits in-between the MAIN circuit and my computer. Aha, I install another surge suppressor onto the outlet and plug my power strip into it. Now I have six doubly protected sockets to plug my computer and peripherals into. All I have to worry about now is the burning timbers

In conclusion, most of these accessory power protectors are unnecessary. Reread your homeowners insurance policy and invest in more insurance if yours is incomplete. Stay away from line filters and the like until you have a problem. If you invest in something, buy a cheap surge suppressor. It will protect you from the unlikely event that your house is struck by lightning or that someone plugs a arc welder into your living room.

## DATA PERFECT

## FILE TO DOS

By Norm Draper  
of Dallas ACE

The following BASIC program will convert a DATA PERFECT database into a file of standard ATARI DOS format. This allows a person to manipulate, or do special reports using BASIC (or other language) programs. I am including two versions of the program. One is for single disk drive owners, the other for two-drive owners. The single-drive program, as written, will convert any database that is 30,000 characters, or less, in length on a 48K RAM system. The two-drive version can convert any size database. The output file consists of fields of data in the length specified when the database was defined to DATA PERFECT.

```

10 REM CONVERT DATA PERFECT DISK TO
20 REM ATARI DOS FORMAT
30 REM BY NORM DRAPER
40 REM SINGLE DISK DRIVE VERSION
50 DIM C$(1),T$(128),A(1),I(1),S(1)
60 DIM L$(FRE(0)-50)
70 ? "Insert Data Perfect disk in
drive 1 and push RETURN":INPUT T$
80 I=1
90 READ A
100 IF A=999 THEN 130
110 POKE 1535+I,A
120 I=I+1:GOTO 90
130 S=32
140 POKE 769,1:REM SET TO DRIVE 1
INPUT
150 Z=USR(1536,S,ADR(T$))
160 FOR I=0 TO 127
170 A=PEEK(ADR(T$)+I)
180 IF A=0 THEN 270:REM END OF FILE
190 IF A=2 THEN 240
200 IF A=3 THEN 240
210 C$=CHR$(A)
220 L$(LEN(L$)+1)=C$
230 ? CHR$(A);
240 NEXT I
250 S=S+1
260 GOTO 140
270 ? "Remove Data Perfect disk"
280 ? "and insert DOS 2.0 disk"
290 ? "and press RETURN"

```

```

300 INPUT T$
310 ? "Enter filespect for output
file-D:*****":INPUT T$
320 OPEN #2,8,0,T$
330 ? #2;L$
340 CLOSE #2
350 END
360 DATA 104,104,141,11,3,
104,141,10,3,104,141,5,3,
104,141,4,3,169,82,141,2,3,169,
64,141,3,3,169,128,141,8,3,169
370 DATA 0,141,9,3,32,89,228,96
380 DATA 999

```

```

10 REM CONVERT DATA PERFECT DISK TO
20 REM ATARI DOS FORMAT
30 REM BY NORM DRAPER
40 REM TWO DRIVE VERSION
50 DIM T$(128)
60 ? "Insert Data Perfect disk in
drive 1 and push RETURN":INPUT T$
70 ? "Enter filespect for output
file-D:*****":INPUT T$
80 OPEN #2,8,0,T$
90 I=1
100 READ A
110 IF A=999 THEN 140
120 POKE 1535+I,A
130 I=I+1:GOTO 100
140 S=32
150 POKE 769,1:REM SET TO DRIVE 1
INPUT
160 Z=USR(1536,S,ADR(T$))
170 FOR I=0 TO 127
180 A=PEEK(ADR(T$)+I)
190 IF A=0 THEN 270:REM END OF FILE
200 IF A=2 THEN 240
210 IF A=3 THEN 240
220 PUT #2,A
230 ? CHR$(A);
240 NEXT I
250 S=S+1
260 GOTO 150
270 CLOSE #2
280 END
290 DATA 104,104,141,11,3,104,141,
10,3,104,141,5,3,104,141,4,3,169,
82,141,2,3,169,64,141,3,3,169,128,
141,8,3,169
300 DATA 0,141,9,3,32,89,228,96
310 DATA 999

```

## =====

## LINE VOLTAGE PROTECTORS

## FOR YOUR COMPUTER

by Thomas M. Krischan

A popular option to add onto your computer system is a line voltage protector. Several different styles of the device are featured on the pages of most computer magazines. They range in price from \$40 to \$150, or more. But do you need one? Here is a summary of what you're buying:

1. Power-line Filters. These filters provide unwanted interference from entering the power-line. Unwanted interference is that blurry picture that occurs when you're watching your favorite TV program and someone plugs in a vacuum cleaner. Or a hum in the AM radio when you turn on a fluorescent light at your desk. There are three suggested ways to remove that interference. One is to eliminate the troublesome electric device; unplug the vacuum cleaner or turn off the light. Another way is to isolate the devices onto separate circuits and place them some distance apart from each other. The third way is to invest in a line filter. Usually the line filter will not totally eliminate the interference. This is because most people install it wrong. The filter is plugged onto the "noisy" device, not onto the equipment you want to protect. The other reason it fails is because it only protects against noise in the power line. Line filters do nothing against RFI (Radio Frequency Interference). Your TV or radio tries very hard to pull in a distant signal. A RFI noisy device is producing lots of signals. The TV or radio can't distinguish between them. The result is a little bit of picture and some "show" or a little bit of music and some hum. Do you really need a line filter? No, not unless you live next door to a 24 hour vacuum cleaner repair store. If your TV viewing and radio quality is satisfactory, you should have no problems with your computer.
2. Surge Suppressors. The normal AC current in your household is 120 volts. If you were to attach an AC voltmeter (don't use your dinky electronics meter) onto an outlet you'd find that the voltage wasn't exactly 120. It varies above and below this value. If you live in a large city you may find that the fluctuation is plus or minus 3 volts. If you live in the boonies you'll find a larger range. Most electronic equipment is built to operate within 10% of the 120 volt "standard". Damage can occur to

your equipment if the voltage gets too high. When a big voltage hog is plugged into a circuit and turned on it produces a wave of high voltage which is passed down the circuit to other devices plugged into the line. Voltage hogs are air conditioners, refrigerators, dishwashers, and most power tools. These waves of excess voltage are called surges, spikes and voltage transients. They can be eliminated by a device called a surge protector. The surge protector consists of a single electrical component called a MOV (Metal Oxide Varistor). Radio Shack sells an inexpensive surge protector (#61-2790) for \$9.95. They also sell the MOV's (#276-570) for \$1.59 and you can build your own. (For information on building your own surge suppressor see Steve Ciaracia's article in the December 1983 BYTE! magazine, pp.36-44.) MOVs effectively "clip" off voltages higher than 150 volts. So you really need a surge protector, right? No, there's more to this story.

3. Preceding the voltage surge is a valley or sag (brownout). When the lights dim in your kitchen the life is also sucked out your computers memory chips. I hope you backed up that program. The cure for lower power is a UPS (not those cute little brown trucks), as Uninterruptable Power Supply. A UPS for a micro sells for \$300 to \$1000. Using the same analogy as above. If you haven't blown up your TV or radio, you're not going to zap your computer. There are some exceptions. A friend of mine was demonstrating a computer to one of his industrial clients at his factory. Unknown to my friend, a factory employee on the other side of the wall had just plugged in an arc welder to the same circuit. When the arc welder was turned on it fried the power supply in the computer. "Gee, sorry about that". Components inside the power supply had actually melted. My friend needed a surge suppressor, But unless you take up welding, I'm not sure that you need one.
4. Lightning strikes may send an enormous amount of voltage down the power line. Enough to blow outlets right out of the wall! After you locate all the pieces of what was your computer, chances are that it is all scrap. What can

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Mail your articles and inquires to the editor at the return address on this newsletter.

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Milwaukee Area Atari Users Group

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